Sheet six

Foster & Cauer LC

[1] Synthesize using elementary synthesis procedures

(i) $z(s)=\dfrac{s^2+2s+6}{s(s+3)}$ (ii) $z(s)=\dfrac{6s^2+3s+2}{2s+1}$

(iii) $z(s)=\dfrac{s+1}{(s^2+4)}$ (iv) $y(s)=\dfrac{9s+2}{s+2}$

(v) $z(s)=\dfrac{10s+15}{5s+6}$ (vi) $y(s)=\dfrac{s^3+4}{s^2+2}$

(vii) $y(s)=\dfrac{7s+2}{2s+4}$ (viii) $y(s)=\dfrac{2(s+2)}{s+4}$

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[2] Find the first and second Foster forms of LC networks for the impedance

LC

(i) $z(s)=\dfrac{s(s^2+2)}{(s^2+1)(s^2+3)}$ (ii) $z(s)=\dfrac{(s^2+1)(s^2+9)}{s(s^2+4)}$

(iii) $z(s)=\dfrac{2s(s^2+4)(s^2+16)}{(s^2+1)(s^2+9)}$ (iv) $z(s)=\dfrac{2s^4++20s^2+18}{(s^3+4s)}$

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[3] Find the first and second Cauer forms of LC networks for the impedance

عرض → (i) $z(s)=\dfrac{(s+2)(s+6)}{(s+1)(s+5)}$ solved (ii) $z(s)=\dfrac{2s^5++12s^3+16s}{s^4++4s^2+3}$

(iii) $z(s)=\dfrac{2s^5++40s^3+128s}{s^4++10s^2+9}$ (iv) $z(s)=\dfrac{s^4++10s^2+9}{(s^3+4s)}$

هو لازم cauer I II

يبقى الـ أعلى من المقام أو العكس "order"

متيجلي اه

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[3] Find the two Cauer networks for the following

RC
RL
LC

(a) $z(s)=\dfrac{(s+1)(s+3)}{s(s+2)(s+4)}=\dfrac{s^2+4s+3}{(s^2+6s+8)}=\dfrac{s^2+4s+3}{s^3+6s^2+8s}$

(b) $z(s)=\dfrac{s(s+2)(s+4)}{(s+1)(s+3)}=s^2$

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من أربع → [4] Obtain four canonical realizations for the following impedance functions

elementary

$z(s)=\dfrac{s(s+2)(s+4)}{(s+1)(s+3)}=\dfrac{(s^2+6s+8)s}{s^2+4s+3}=\dfrac{s^3+6s^2+8s}{s^2+4s+3}$

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[5] Find two possible realization (Foster or Cauer) for the following impedance functions

(i) $y(s)=\dfrac{2(s+1)(s+3)}{(s^2+2)(s^2+4)}$ (ii) $y(s)=\dfrac{s(s+3)}{3(s+2)(s+4)}$

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Foster

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Third year Communications	Systems and Networks

Sheet Seven

RC and RL network synthesis

[1] Synthesize the following RC and RL networks

(i) The impedance function using Foster I form:

$$z(s)=\frac{(s+1)(s+3)}{s(s+2)}$$

(ii) The admittance function using Foster II form

$$y(s)=\frac{s(s+2)}{(s+1)(s+3)}$$

(iii) The impedance function using Cauer I form

$$z(s)=\frac{s^2++4s+3}{s^2++2s}$$

(iv) The impedance function using Cauer II form

$$z(s)=\frac{3+4s+s^2}{2s+s^2}$$

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ster I&II ⇐ كله
Cauer I&II

[2] Find all possible realization (Foster & Cauer) for the following:

(i) $z(s)=\dfrac{3(s+2)(s+4)}{s(s+3)}$ (ii) $z(s)=\dfrac{2s(s^2+2)(s^2+4)}{(s^2+1)(s^2+3)}$

……………………………………………………………

cauer II&I
foster II&I

[3] Find four realizations for the following:

$$z(s)=\frac{2s^4+20s^2+18}{s^3++4s}$$

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test لكل
وفي أجزاء

[4]Test whether the following impedance functions are LC or RC or RL or none

(i) $z(s)=\dfrac{s(s+2)(s+4)}{(s+1)(s+3)}$ (ii) $z(s)=\dfrac{s(s^2+2)}{(s^2+3)(s^2+4)}$

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[6] Which of the following functions is an RL impedance?

(i) $z(s)=\dfrac{s^2+6s+8}{s^2+4s+3}$

(ii) $z(s)=\dfrac{2s^2+5s+2}{s^2+5s+4}$

Synthesis it in Cauer form.

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